8th, the earth of the prairies was cracked so as to make it dangerous to ride across them. The last rain fell here on the evening of July 29th. In Hood county, Texas, the drought and dust were extremely bad; on public roads the dust was a foot in depth. The Springfield *Daily Union* (Ills.) of November 24th states that the "drought in some parts of the west was so severe that water was carried from the Mississippi river at Louisiana, Mo., both east and west into Illinois and Missouri for a distance of 75 miles and nearly all railroads running from the river to the interior had a water train."

Floods.—Kansas City, Mo., on the 13th the Kaw river rose five feet in 24 hours, "heaviest freshet ever known" at that place.

RELATIVE HUMIDITY.

The percentages of mean relative humidity for the month range as follows: New England, 69 to 83; Middle Atlantic States, 59 to 75; South Atlantic States, 61 to 77; Eastern Gulf States, 66 to 79; Western Gulf States, 58 to 75; Ohio valley and Tennessee, 59 to 69; Lower Lake region, 70 to 77; Upper Lake region, 67 to 82; Upper Mississippi valley, 63 to 69; Lower Missouri valley, 52 to 73; Red River of the North valley, 77 to 84; Northern Rocky Mountain Slope, 48 to 56; Texas, 16 to 88; Western Plateau, 47 to 64; California, 61 to 73; Oregon, 78 to 86 *High stations* report the following averages, not corrected for altitude: Mt. Washington, 90.4; Pikes Peak, 52.7; Santa Fe, 46.7; Denver, 49.3; Cheyenne, 39.7; Virginia City, 56.8.

WINDS.

The prevailing winds, at Signal Service stations, are shown by the arrows, flying with the wind, on Chart No. II. The general direction along the Atlantic coast has been northerly, but at the interior stations, Atlanta, Augusta, Charlotte, Lynchburg, Albany and Burlington, and thence to the Southwest, Missouri, Illinois and Michigan, southerly. North and west of this region northwesterly winds predominated. On the Pacific coast they were southerly at Portland and Olympia, and northerly in California. Below are given some of the maximum velocities, in miles per hour, and some of the larger and smaller total monthly movements, registered at the Signal Service stations:

Maximum Velocities of Winds.—3rd, Thatcher's Island, E., 64 miles per hour; 6th, Ft. Custer, NW., 48; 9th, San Francisco, SE., 36; 10th, Key West, NW., 36; 11th, Red Bluff, SE., 42; Winnemucca, SW., 45; Salt Lake City, S., 28; th, Cheyenne, W., 48; Denver, NW., 34; North Platte, W., 54; Cairo, SW., 56; 16th, Dodge City, N., 48; 17th, Coleman, Tex., N., 48; 18th, Kittyhawk, N., 50; Indianola, N., 52; Galveston, N., 38; 19th, Ft. Stevenson, Dak., W., 60; Bismarck, N., 46; Pembina, NW., 40; St. Paul, NW., 46; Madison, NW., 40; Grand Haven, W., 42; Punta Rassa, NW., 46; 20th, Cape Henry, NW., 52 miles; Cape May, NW., 83; Sandy Hook, NW., 60; Sandusky, NW., 62; Morgantown, NW., 45; Atlanta, NW., 36; Cape Lookout, NW., 46; Albany, NW., 44; 24th, Breckenridge, NW., 44; 25th, Virginia City, NE., 36; 26th, Sacramento, N., 36; 28th, Pike's Peak, N. 80; Wood's Holl, S., 40; 29th, Cape May, NW., 50; 30th, Mt. Washington, NW., 108.

Total Movements of the Air.—The following are the largest total movements recorded in miles at the Signal Service stations, during the month: On the summit of Pikes Peak, 18,192 miles; Cape May, 14, 347; Portsmouth, N. C., 12,103; Thatcher's Island, 12,068; Sandusky, 11,940; Cape Lookout, 11,561; Kittyhawk, 11,396; Sandy Hook, 11,367; Cape Henry, 10,642; Wood's Holl, 10,416; Indianola, 10,052; Erie, 10,056; Cape Hatteras, 9,938; Cleveland, 9,809; Key West, 9,589; Barnegat, 9,231. On the summit of Mt. Washington the working of the anemometer was interfered with by frost-work. The *smallest* are, Visalia, Cal, 1,457 miles; Socorro, N. M., 1,596; Deadwood, Dak., 1,659; La Mesilla, N. M., 1,744; Salt Lake City, 2,222; Lynchburg, 2,312; Nashville, 2,646; Uvalde, Tex., 2,652; Augusta, 2,781; Virginia City, 2,858; Ft. Davis, Tex., 2,888; Cedar Keys, Fla., 2,953; Dubuque, 2,976.

Local Storms.—Pageville, Cass co., Mo., 8th, 2:15 p. m., a severe tornado passed over the town from the southwest, destroying the depot building of the Pacific railroad, several stores and dwellings and a blacksmith's shop, all which was done in less than one minute. Several persons seriously and two fatally injured. An empty wagon, team and driver were carried about 100 yards. Near Fort Smith, Crawford, Co., Ark. 8th, about 3 p. m. a severe tornado accompanied with hail, (stones 2 or 3 inches in diameter,) passed to the northeastward. "The storm cloud looking like black smoke from a large furnace and its shape was like a funnel with its inside red as fire; the roaring was terrible and the cloud was filled with pieces of timber, branches of trees and fragments of clothing; everything was swept clean over the path of the storm which was very narrow; one person killed and several seriously injured." Detroit, Mich., 12th, 5 p. m. "a very destructive 'tornado' visited the northwestern part of the city, creating considerable havoc. The sky suddenly became overcast, a gale sprung up from the west and southwest which soon reached the velocity of a hurricane and swept houses, fences, gates &c. before it, the path was not over 500 feet wide." Rapids Parish, La., 14th, 'on Elmwood plantation, ten miles below Alexandria, twelve buildings were destroyed by a severe tornado. The track of the storm was about 250 yards wide and swept all objects before it; no lives were lost; the plantation bell weighing 300 pounds and numerous ploughs and parts of wagons were lifted up and transported long distances.; entire loss estimated at $10,000.' In Ouachita Parish, La., probably on the 14th, 'a tornado passed over Fisher's Landing, on Black river, destroying two or three houses and injuring several people;' Cairo, Ill., 14th, a "tornado, accompanied by hail and heavy rain struck the city at 1 p. m., demolishing several buildings and unroofing many others; one child was blown some distance and killed." Terre Haute, Ind., 14th, a. m., a violent wind and rain storm passed to the northeast, a

few miles south of the city, demolishing buildings and fences and uprooting trees. At Paoli and Princeton, Ind., 14th, a. m., a heavy "tornado" passed northeastward, unroofing houses and blowing down fences. Norwalk, Huron county, Ohio, 14th, about 11 a. m., a "terrible wind-storm or tornado" passed over the central portion of the county in a northeasterly direction, "tearing houses to pieces and scattering the contents in every direction; straw stacks, orchards, fences and barns were demolished, trees uprooted and animals killed." Louisville, Ky., 28th, 5:45 a. m., "a severe tornado swept over the southeastern portion of the city, marking its pathway by a broad track of demolished fences, uprooted trees and injured houses. The storm was a fearful one and passed directly from the southwest to the northeast. The cloud was an immense dark, whirling, tossing mass, which seemed to possess a wrenching, spiral motion, to which much of the damage was in all probability due. The wind was terrific, and carried every obstacle before it; coming at first in heavy gusts, it soon reached a steady hurricane-velocity." Greensburg, Ind., 28th, a. m., a heavy wind and rain-storm visited this place, blowing off roofs and tearing up trees. Madison, Ind., 28th, about 5 a. m., a heavy wind and rain-storm, accompanied with severe thunder and lightning passed over the city, causing considerable damage. Seymour, Ind., 28th, "about noon a dark and angry looking cloud rose in the west causing such intense darkness that it became necessary to light lamps. As it came up it rolled over and over making one revolution after another in quick succession. As it approached the town it rose and fell, sometimes coming below the tree-tops, shaving off every limb it came in contact with as if it had been done with an axe. When above the trees the sound of the wind resembled that of a mighty cataract. Its path was not over 200 yards wide and direction from southwest to northeast."

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily weather indications for November with the telegraphic reports for the succeeding twenty-four hours, shows the general per centage of omissions to be 0.03 per cent., and of verifications to be 90.8 per cent. The percentages for the four elements have been—weather, 94.0; direction of the wind, 88.9; temperature, 92.4; barometer, 87.8. The percentages of verification by geographical districts, have been: New England, 93.1; Middle States, 91.5; South Atlantic States, 90.6; Eastern Gulf States, 92.3; Western Gulf States, 88.7; Lower Lake region, 91.2; Upper Lake region, 92.4; Tennessee and the Ohio valley, 92.4; Upper Mississippi valley, 87.2; Lower Missouri valley, 87.6; Northern Pacific coast region, 95.0; Central Pacific coast region, 98.3; Southern Pacific coast region, 97.5. Of the 3,689 predictions that have been been made, 95, or 2.58 per cent. are considered to have entirely failed; 92, or 2.49 per cent. were one-fourth verified; 268, or 7.26 per cent. were one-half verified; 159, or 4.31 per cent. were three-fourths verified; 3,075, or 83.36 per cent. were fully verified, so far as can be judged from the tri-daily weather maps.

Cautionary Signals.—236 Cautionary signals were displayed during the month, of which 219, or 92.8 per cent. were justified by winds of 25 miles per hour or over, at, or within a radius of 100 miles of the station. 82 Off-shore Signals were displayed, of which 80, or 97.6 per cent. were fully justified. Of the Cautionary Off-shore Signals 58 were changed from Cautionary. 260 of both kinds were displayed, of which 242, or 93.1 per cent. were fully justified. The above does not include 52 Signals ordered at display stations where the velocity is only estimated. Six signals were reported somewhat late; 67 cases were reported of winds of 25 miles or over where signals were not ordered.

NAVIGATION.

In the table on the right hand side of Chart No. III are given the highest and lowest readings of the Signal Service river gauges for the month, with the dates of the same. During the first half of the month the rivers in general continued quite low. From the 14th to the 25th higher readings were generally reported, but in no case did they approach near the danger-marks. The heavy rains previous to the 15th made a good navigable river in the Ohio at Pittsburgh for the first time since the early part of August. On the 18th low water on the Lower Fox river, Wis., compelled manufacturies to run short time.

Ice in Rivers and Harbors.—The mild weather prevalent throughout October and the first half of November delayed the formation of ice to such an extent as not to interfere with navigation, except on the Upper Missouri and Red river of the North, until the last few days of the present month. The following notes on the formation of ice are of interest: The *Missouri* was closed by ice at Fort Buford, Dak., on the 27th; at Ft. Stevenson, Dak., floating ice passed down the river on the 2nd, 3rd and 21st, and the river was closed by ice from the 23rd to the 28th; at Bismarck, Dak., river froze over on the 2nd, but ice broke up on the 4th, and on the 27th the river was closed by ice; at Ft. Randall, Dak., floating ice passed down on the 22nd; at Yankton, Dak., floating ice was observed during the entire month; on the 20th the ferry-boat was frozen in; on the 29th the channel was frozen over for eight hours and navigation closed; at Plattsmouth, Neb., floating ice passed down on the 3rd and 4th, and on the 20th and 21st—on the 22nd it gorged at the railroad pile-bridge, and on the 24th and 25th the gorge lifted out the piles and destroyed bridge—26th, river was free of ice, but on the 29th and 30th floating ice was again reported. The *James River* at Morristown, Dak., was frozen over on the 1st—on the 7th the ice had all disappeared, but by the 27th the river was again frozen over. *Red River of the North.*—At Pembina, on the 1st, large quantities of floating ice passed down, and on the 2nd the river froze over and navigation closed, but on the 6th the ice was fast breaking up; at Winnepeg, Manitoba, on the 3rd, an ice bridge had formed over the river and persons crossed on foot. *Mississippi.*—At St. Paul, Minn., on the 2nd and the 24th the river was partly frozen, on the 20th full of floating ice, and owing to the masses of